From traditional to tech-savvy: An empirical investigation of students' actual use of LMS in Saudi universities

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ABSTRACT

The primary objective of this research endeavor is to comprehensively comprehend the impact of identified research factors on students' intentions to utilize learning management systems (LMS) in Saudi Arabian universities. In order to achieve this objective, the study has incorporated two prominent motivational models, namely the DeLone and McLean Model, and the technology acceptance model (TAM). The hypothesized relationships were succinctly depicted and experimentally validated through a sample of 224 students from Saudi Arabian universities. The findings of the study reveal significant correlations among all the proposed hypotheses. The research model employed in this project demonstrates that system quality, information quality, service quality, perceived usefulness, perceived enjoyment, and perceived ease of use exert direct influence on university students' intentions to employ LMS. Moreover, the research model highlights that the intention to use LMS significantly impacts actual usage behavior. By developing an innovative and integrated model for gauging students' genuine individual intentions to use LMS, this research paper makes a valuable contribution to the existing literature.

1. Introduction

The rapid advancements in communication and information technology not only have accelerated the pace of human life but also changed people's ways of learning (Lui et al., 2013). Several governments and business agencies have made heavy investments in technology to improve academic achievement (Al-Mamary et al., 2020; Al-Mamary, 2022a) and educational institutions have begun to incorporate new technologies into their teaching and learning processes.

Institutions have started to use learning management systems (LMS) as a standard platform for students and instructors to communicate digitally. The fundamental goal of the LMS seems to monitor students' learning, continuous advancement, and quality achievement across all the skills required for effective training sessions. Thus, the LMS market and its use in higher education have been steadily increasing throughout the United States and internationally, and indeed, this advancement is expected to keep on proceeding in the coming years.

Nonetheless, contrary to popular belief, the implementation of this framework may be extremely difficult, with numerous failures (Bhuasiri et al., 2012). If students do not use LMS systems such as Blackboard, Moodle, and Canvas now and in the future, the benefits of using them will be limited (Lai et al., 2012). The studies show that regular users' intentions to choose a new system have always been mainly affected by their own preconceptions of its own effectiveness as well as user-friendliness (Al-Gahtani, 2016). Trying to investigate student teachers' real intentions as well as other critical variables that impact one's thoughts and opinions on e-learning could perhaps support academic administrators in creating a successful strategy in order to entice a handful of university students who would like to participate in a digital learning

platform (Al-Adwan et al., 2013). This is because LMS success is largely dependent on college student usage (Park, 2009; Teo, 2016), but their potential benefits have always been significantly lower if college students never use them.

As far as Saudi Arabia is concerned, remarkable technological advancement has been achieved. LMS has been used in conjunction with other methods at universities. Smart learning environments, smartboards, and teleconferencing are some examples of LMS application platforms (AlShammari, 2020). In Saudi universities, the JASUR LMS isn't the only e-learning platform used, while Blackboard and Design Learning are some of the other LMS that have been implemented in other parts of the world (AlShammari, 2020). E-learning provides the capability of instructional and acquiring knowledge practices whilst also developing teaching power structures with or without an enhanced efficiency platform for classroom instruction among many high school seniors, as well as better information delivery services (Alfraih and Alanezi, 2016). Thus, according to Turban et al. (2015), digital e-learning allows people to stay updated by allowing them to acquire knowledge in unconventional different manners. According to reports, digital e-learning allows understudies to acquire better knowledge from the comfort of their own houses and apartments, while also allowing staff members to better understand and keep updating relevant knowledge and capabilities from their own workplace environments while minimizing traditional classroom instruction time and energy by more than 50%. It cuts instructional and acquiring knowledge costs by more than 50-70 percent (Garrison, 2011). Moreover, it supports the delivery of lectures to a large number of students while also allowing them to communicate directly as well as collaborate with experts in the field, while also allowing the expert to analyze the students' progress. For all of those who tend to prefer never to participate in traditional college courses or to converse with instructors and classmates in person, this same e-learning system provides an effective and efficient framework to do so. Regardless of all these advantages, the use of LMS is still not comprehensive in Saudi Arabia. AlShammari (2020) stated that general LMS usage in Saudi Arabia was well beneath what was considered a reasonable and necessary standard. This seems to be attributable to the real sense that university graduates in Saudi Arabia have always been predicted to face a multitude number of experiences (AlShammari, 2020). Notwithstanding their prevalent use, it's not like all top college and university students are intimately acquainted with each other, and others are unwilling to fully exploit one another.

While LMS use has become effective in developed economies, it is still considered low in developing countries. Technical Support, Instructional Design, and Self-Efficacy are said to be some of the barriers that may impact the utilization of LMS. As a result, it's critical to examine the components which thus affect student teachers' behavioral intention to be using e-learning infrastructure for all decision-makers to start paying more recognition to those certain specific concerns and actually assist students to learn and succeed. In this digital e-learning research, several other conceptual frameworks were used to determine the factors that may influence and have quite a substantial influence on the ability and willingness of fairly frequent users to learn new things, as well as their ability to use cutting-edge innovations. The prime focus of this research is to determine how these different factors affect university students' real behavioral intentions, along with the application of LMS in Saudi Arabia.

The researchers have used the McLean Upgrade Modified IS Success Theoretical Model, as well as the Motivational Model. For education, the model has grown into an important phenomenon—a completely natural, reliable source of learning and accomplishment that may be carried out painstakingly blocked or stimulated by family member-teacher interactions (Dulloo et al., 2014). However, because these three models are complementary, by merging the principles of these three models, this study may provide a more thorough theoretical framework for understanding LMS adoption. To solve the above, a due diligence conceptual framework is designed, and nine study research questions and hypotheses are postulated related to the three established technology adoption models. This due diligence conceptual model has been extensively examined using survey data that was collected from current graduate students at randomly chosen Saudi universities in Saudi Arabia.

2. Literature review

The DeLone and McLean (2003) theoretical model is among the most comprehensively commonly applied techniques for accurately assessing IS usage and implementation in terms of technology usage and outcomes (Sedera et al., 2004). The current model provides a series of measurements obtained from a wide range of IS tremendous success-specific categories, essentially making it a comprehensive and complete instrument. Among some of the six IS relative success characteristics are business model excellence, user satisfaction, and organizational performance. However, since 1992, several other evidence-based investigations into the correlation coefficients between some of the measures of IS success and achievement have been successfully performed (Goodhue and Thompson, 1995; Etezadi-Amoli and Farhoomand, 1996; Guimaraes and Igbaria, 1997; Rai et al., 2002). Delone and McLean's (2003) customized IS success conceptual framework can sometimes be tailored beyond the requirements of the brand-new digital e-learning ecosystem. As a logical consequence, Wang et al. (2007) created a quantifying device to ascertain the performance of LMS applications in a corporate environment based largely on Delone and McLean's IS success model.

In the general framework of LMS, the synthesized D&M ISS model has indeed been implemented in a number of systems. Lin (2011) presented a framework for investigating the possible dimensions influencing college students' efficient and effective use of e-learning. Recently, Ghazal et al. (2018) also used improved DeLone and McLean IS success models and re-specified IS success models proposed by various researchers and practitioners to continue investigating the influential attributes for individual self-satisfaction and adaptation of LMS utilization in a higher education context. The computer information system, information, and service quality all subconsciously influenced particular passages of behavioral intention and overall user satisfaction (Cheng, 2012). Fig. 1 depicts DeLone and McLean model.
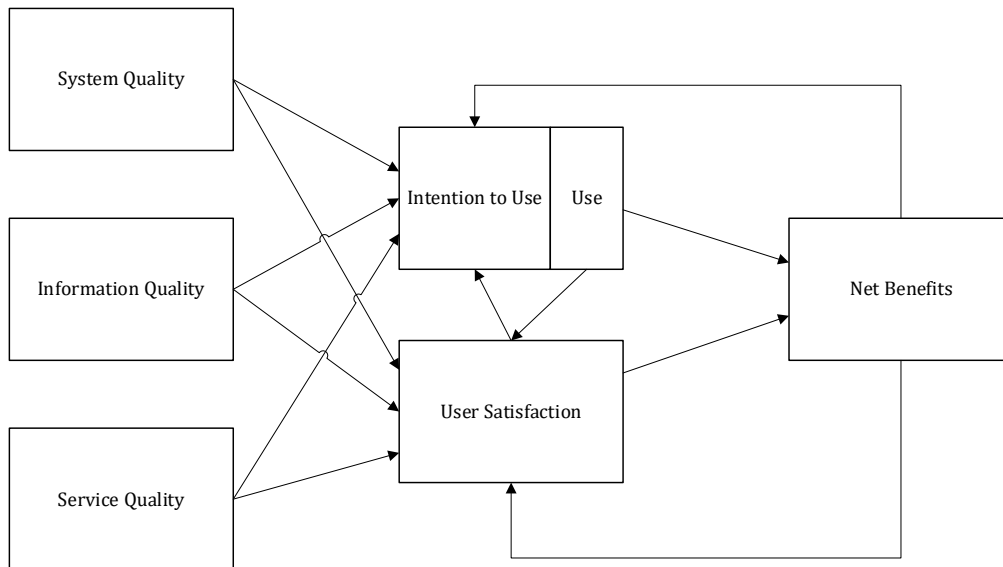

Fig. 1: Updated DeLone and McLean information systems (IS) success model (DeLone and McLean, 2003)

The core principle behind this model is the motivation theory in psychology (Bagozzi et al., 1992). Several research studies have looked at motivational theory and adapted it for unique situations, as well as using it to develop a greater understanding of emerging technology acceptance and usage (Venkatesh and Speier, 1999; Alkhwaldi et al., 2017). According to Davis et al. (1992), real motivation to succeed is expressed in perceived utility, whereas intrinsic motivation is shown in enjoyment. The existing model and others that have recently emerged as an important psychological phenomenon for classroom teachers provide a highly bioavailable model of academic achievement that can be comprehensively impeded or precipitated by student-teacher personal interactions (Dulloo et al., 2014).

According to the Motivation Model, individuals' behavior is dependent on both extrinsic and internal motives (Bagozzi et al., 1992; Alomary and Woollard, 2015). Extrinsic motivation corresponds with doing something because it has been shown to assist users accomplish measurable benefits that seem to be unrelated to the intervention, including increased job satisfaction, compensation, or special promotions (Alkhwaldi et al., 2017).

The Motivational Model (MM), whilst extending the technology acceptance model (TAM), includes enjoyment as being a factor in deciding whether or not to utilize technology. According to MM, PU, and enjoyment, which are related to the intent to utilize a system, are influenced by output quality and PEOU (Venkatesh et al., 2003). Furthermore, the conceptual model suggests that intentions to use modulate the type of incremental model of PU and enjoyment of system usage. Finally, the model posits that task importance will regulate the long-term relationships among both PU and PEOU, as well as output quality (Panagopoulos, 2010). The theory is depicted in Fig. 2.

The TAM (Davis, 1989), which makes decisions based on Davis' TRA, was the first to include psychological aspects influencing technology acceptance. TAM was created and validated by Davis (1989), who improved and validated new measures for forecasting new tech utilization. According to Bagozzi (2007), TAM has a substantial impact on technology acceptance studies. PU and PEOU are two independent variables in the TAM (PEOU). Davis (1989) characterized PU, as the great extent in response towards something that a particular ordinary individual claims to believe that leveraging on a specific information system platform could very well enhance his or her career development, whereas PEOU is to a large and significant degree that a particular individual appears to believe that leveraging on a particular information system scheme would indeed be an investment of extra time for free. TAM users' lack of willingness to select a specific system is largely determined by PU and PEOU, with both the real behavioral intention to use something as an independent third party and overall system use (Fig. 3) (Samaradiwakara and Gunawardena, 2014). This same perceived ease, however, is also presumed to have a beneficial effect on overall relative importance.
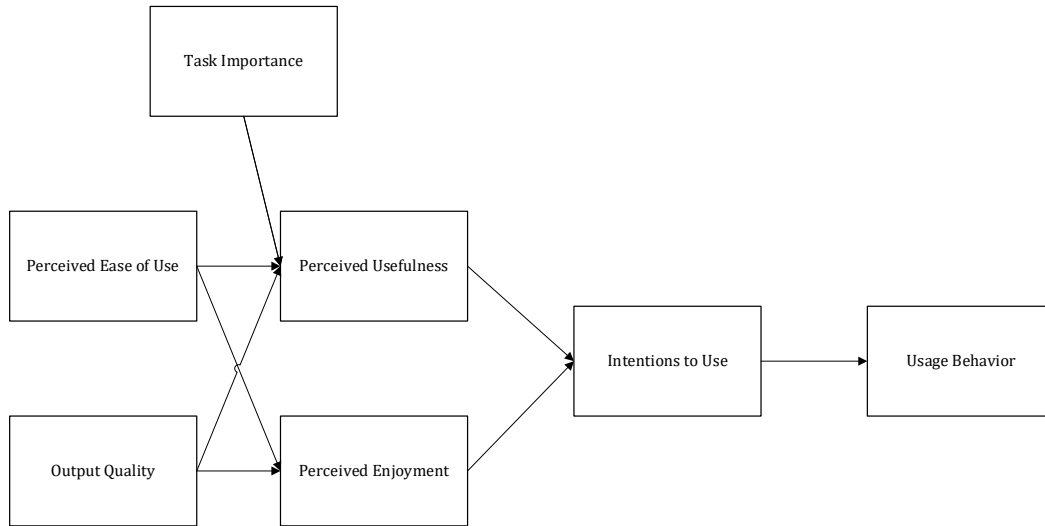
Fig. 2: Motivational model (Davis et al., 1992; Panagopoulos, 2010)

The basic concept of the TRA was being used to explicitly state the fundamental correlation between different major determinants and perceptions, perceived behavior control, as well as actual professional technological advancement usage patterns. Perceived usefulness describes behavioral intention, whilst perceived utility and PEOU accurately determine judgmental attitudes towards a more specific person. Davis (1989) and Davis et al. (1989) described future tech usage patterns and easily recognize the basic components that help individual users' inclusion or exclusion of advanced technologies by their ability to combine unique advancements with organizational culture constructs. The two most prominent attributes are PU and PEOU. Thus, Shroff et al. (2011) confirmed that, besides controlling those same two components, application designers could indeed best affect users' ideas about structure and framework and therefore also foresee their own cognitive and behavioral intentions as well as the actual usage of the system (Alomary and Woollard, 2015).
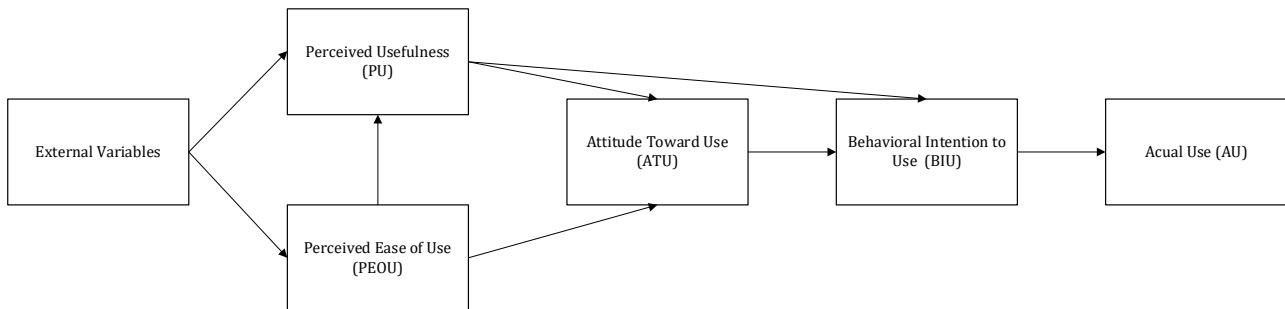

Fig. 3: TAM (Davis et al., 1989)

When TAM and the DeLone and McLean update IS success model are compared, the former model has more comprehensive concerns about system utilization than the latter one. This is understandable, given that TAM was created with the goal of evaluating an individual's user viewpoint on understanding and acceptance of advanced technologies (Al-Mamary, 2022b). In the same vein, the DeLone and McLean revised IS success conceptual framework focuses on the interconnection between individual users' true happiness, overall system utilization, and their own implications on complete and utter positive effects, whereas TAM does not appear to. In terms of evaluating an information system's overall performance, both TAM and the DeLone and McLean update IS success conceptual framework has some elements of merit and drawbacks.

Furthermore, the motivational model has recently emerged as an important concept for academics, a primary cause of academic achievement which can be comprehensively impeded by parent-teacher personal interactions (Dulloo et al., 2014). Notwithstanding, because all these three models do seem to be comparable, by incorporating the constructs of all three models, this research article could indeed establish a much more suitable theoretical framework for trying to analyze LMS acceptance and understanding. LMS is becoming an extremely important device for numerous different global investments, specifically designed to support learning and development opportunities. The importance of having an LMS in universities and colleges is not strictly limited to instructional effectiveness. Rather, it appears to reinforce a better method of sharing information and experiences (Ghazal et al., 2018; Al-Mamary, 2022c; Abubakar et al., 2023).

Therefore, as a necessary consequence of COVID-19, many nations around the globe, including Saudi

Arabia, have implemented reforms such as various signals, total individual segregation, and self-quarantine, with significant political and interpersonal ramifications globally (Alqahtani and Rajkhan, 2020; Anderson et al., 2020). As a significant number of individuals around the universe spend more time at home to limit the spread of the coronavirus, their aims of improving their lives and, in the student learning process, participation in academic achievement have indeed been affected.

But nevertheless, as government and business agencies tighten their grip, advances in information technology are already putting a spotlight on possible approaches. It is imperative to study the dramatic transformation caused by the technological advancements in ICT infrastructure in the research domain of young people's lives, especially regarding their involvement in access to higher education especially during the COVID-19 endemic problem (Raza et al., 2021).

The first case of Corona was detected in Saudi Arabia in February 2020. In March 2020, the administration put an end to school attendance. The Education Ministry has decided to pursue wireless device teaching and learning, leveraging all free web-based satellite channels to ensure learning and teaching for all students. Cultural norms influence kids' and teachers' acceptance and perceptions, as well as parental views (Alakrash and Razak, 2019). As a result, there is a compelling need to explore Saudi students' attitudes and lots of brilliant ideas about web-based learning during a major COVID-19 problem as nothing more than a one-of-a-kind wide range of opportunities in specific terms of geographical location.

In Saudi Arabia, there has been little research into the correlation here between LMS by Saudi college students and external environmental factors. Furthermore, KAU's recent adoption of LMS needs an examination of the system's acceptance from the students' standpoint. According to Alharbi and Drew (2014), experts have failed to use TAM to evaluate LMS in Saudi Arabia. As a result, we looked at the TAM original version, which contained the major components (PU, PEOU, daily usage attitude, and actual usage pattern). Furthermore, Binyamin et al. (2017) examined students' viewpoints experimentally. They claimed that it is worthwhile to assess LMS adoption and conduct an investigation into factors that can influence implementation from the perspective of at least high school and college students. From the research results, background knowledge of LMS, personal satisfaction, cultural consequences, students' self, and instructional role all significantly influence student teachers' utilization of LMS. As a result, it's not surprising that TAM hasn't used it to evaluate Saudi students' adoption of LMS. Many difficulties surround the overall awareness and comprehension of the LMS application process (Al-Busaidi and Al-Shihi, 2010).

3. Conceptual model

Al-Mamary et al. (2020) studied the role of specific variables on cognitive and behavioral willingness to use the same digital e-learning techniques purely premised on the specific aim of the research and the previously discussed existing literature. According to earlier literature, the most critical areas attempting to influence undergraduate preconceptions regarding the use of LMS applications are regarded as trustworthiness, relative advantage, quality of services, PU, user satisfaction, and PEOU. Fig. 4 demonstrates the theoretical conceptual model created for this study to achieve the main goal.

4. Methodology

4.1. Research design

To achieve the overall study aims and objectives, the quantitative research approach was used because it demonstrated the research conceptual model, which investigated the new integrated conceptual model postulate in Fig. 4. The study was conducted to explore the critical variables impacting actual LMS usage patterns within and between University of Hail graduate students. Data were extracted using a structured survey instrument on system quality, information quality, service quality, PU, perceived enjoyment, PEOU, actual intention to use, and usage behavioral intention. The completed questionnaires were also based on previously valid and reliable tools from the contemporary literature. The conceptual framework model was fully analyzed using SEM and Smart PLS.

The research approach was employed specifically to showcase and thoroughly investigate what happened with the variables affecting LMS utilization within and between Hail University students. The survey methodology utilized in this research paper was also used to collect relevant information on quality dimensions, user satisfaction, customer experience, PU, e-satisfaction, PEOU, actual intention to use, as well as usage intention. The questionnaire's specific items were derived from previous valid and reliable tools from the scientific literature. The conceptual framework model was examined only using SEM and Smart PLS.

4.2. Research instrument

This study's independent and dependent variables are formed by the combination of 33 questionnaire items. Those very same items were selected, modified, and customized based on previous research. The assessment process of technology acceptance was adopted by Wixom and Todd (2005), McKinney (2002), and Ragu-Nathan et al. (2008). Measuring the quality of information was adopted by Ozkan and Koseler (2009).
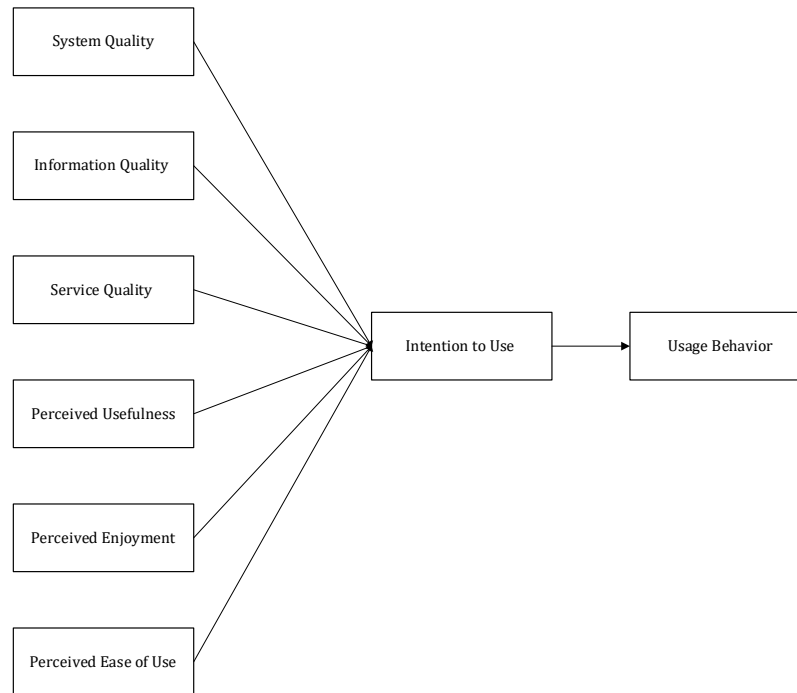
Fig. 4: Research model

Furthermore, the service quality measurement tool had also been perfectly incorporated and adjusted by Pitt et al. (1995) and Chang and King (2005). Besides, the measurements of PU, PEOU, and perceived enjoyment were adopted from Lee and Chen (2010) and Thong et al. (2006) respectively. Furthermore, the measurement of the intention was adopted from Bhattacherjee (2001). Finally, the measurement of usage behavior was adopted by Mohammadi (2015).

There are four sections to the measuring instrument. Section A contains questions aimed at gathering demographic information from responders. Gender, age, program, and college are all included in this data. Section B has 28 items that have been adapted from prior studies and evaluate six dimensions (PU, PEOU, system quality, information quality, service quality, and perceived enjoyment). Three items from earlier studies are included in Fig. 4. Those same specific items are most often used to gauge individuals' choices and intent to use them. Two components modified from the immediately preceding research findings were included in section D to estimate utilization behavior and attitude. Furthermore, the scale of measuring techniques runs from 1 to 5, 1 represents "strongly disagree" and 5 represents "strongly agree." The survey questionnaire was pilot tested before being widely circulated. Items were rephrased where necessary to make them more appropriate for the current study.

4.3. Sampling and data collection

The research data was managed to be consolidated by simply sending the survey link to all the concerned college students via student classroom WhatsApp groups. Further to that, with the assistance of specific academic representatives,

the survey questionnaires have also been widely shared via the electronic platform called Blackboard. The data for the study was obtained from 280 students from the University of Hail's business stream, both male and female. The questionnaire was piloted among 60 students from various streams for validity. The information was gathered from students at the University of Hail's art, business administration, science, and engineering colleges. The samples were chosen at random.

5. Results and analysis

The survey questionnaire was administered via social media to undergraduate students at Hai'l University, Saudi Arabia's business college. The survey questionnaire was also distributed to the target respondents, which took an average of 5 minutes to complete. Fortunately, 238 understudies decided to volunteer to take part and fill in the survey questions, resulting in 224 usable questionnaires. The collected information revealed that female students had a higher gender redistribution, with 143 female respondents (63.8 percent). Conversely, there seemed to be 81 young male students who participated in the survey, accounting for nearly 36.2 percent of all survey participants. With something like a percentage of 85.7, the proportion of participants was under the maturity level of 25.

5.1. Measurement model assessment

Hair et al. (2019) proposed four types of multiple linear regression evaluations for PLS-SEM: Consistency reliability, discriminant validity, convergent validity, as well as an indicator of factor loadings.

5.1.1. Loadings of reflective indicators

In the case of highly reflective loadings, the loading indicator should therefore be approximately equal to 0.700 (Hair et al., 2019). Similarly, all loadings were found to be greater than 0.700.

System quality SQ3 seemed to have the highest factor loading (0.896), whilst information quality InfQ4 seemed to have the lowest factor loading (0.756). Thirty items were used to assess the subsequent analytical procedure (Table 1).

Table 1: Constructs, items, CR, CA, AVE

Construct	Items	Composite reliability	Cronbach's alpha	AVE
Information quality	InfQ1-InfQ6	0.837	0.750	0.503
Perceived enjoyment	PE1-PE3	0.885	0.809	0.723
Perceived ease of use	PEU1-PEU4	0.838	0.741	0.574
Perceived usefulness	PU1-PU3	0.878	0.792	0.715
Service quality	SQ1-SQ6	0.903	0.854	0.643
System quality	SYSQ1-SYSQ6	0.934	0.903	0.721
Intention to use	ITU1-ITU3	0.861	0.751	0.690
Usage behavior	UB1-UB2	0.945	0.884	0.896

5.1.2. Internal consistency reliability (ICR)

The ICR method was used to assess the consistency and stability of the results outcomes throughout all the key indicators. CA and CR have always been repeatedly reported in the current way of doing things. ICR values could perhaps range between 0 and 1. As a result, CA and CR must be significantly greater than 0.700 (Hair et al., 2019; Habibi-Yangjeh et al., 2020). Table 1 outlines the reports that show CA and CR. The composite reliability and CA values for all independent and dependent variables seem to be adequate, representing the maximum level.

The CA for information quality seems to have been 0.750 and the CR seems to be 0.837; the CA for perceived enjoyment was 0.809 and the CR was 0.885; the CA for PEOU was 0.741 and the CR was 0.838; the CA for perceived usefulness was 0.792 and the CR was 0.878; the CA for service quality was 0.854 and the CR was 0.903; the CA for system quality was 0.903 and the CR was 0.934 (Table 1).

5.1.3. Validity of convergence

Convergent validity shows the reliability issue wherein the standardized evaluation using roughly equivalent components should indeed be strongly linked (Hair et al., 2019). This study investigated the information processing of convergent and discriminant validity. To further calculate the AVE, however, we still used SmartPLS 3.3.7 (Hair et al., 2019). The algorithm techniques require AVE basic values of 0.500 or marginally higher (Al-Mamary and

Alshallaqi, 2022; Rehman et al., 2022; Al-Ghurbani et al., 2022; Alshebami and Al Marri, 2022; Al-Mamary and Alraja, 2022; Alshebami, 2022). The estimation yielded AVE values for all independent and dependent variables that explained more than 0.500 of the discrepancies. The AVE alpha value coefficient for information quality seemed to be 0.686, for perceived enjoyment was 0.666, for PEOU was 0.648, for PU was 0.647, for service quality was 0.674, for system quality was 0.728, for intention to use was 0.728, and for actual use of usage, the behavior was 0.669 (Table 1).

5.1.4. Discriminant validity

The extent to those structural models can be scientifically verified from numerous different structural constructs is meant to be referred to as discriminant validity. In this research project, the Fornell–Larcker (Fornell and Larcker, 1981) eligibility requirements are being used to thoroughly investigate discriminant validity (Table 2). The AVE core principle should always be significantly larger than the shared variance of so many others, as per the Fornell–Larcker criteria. The structural model values presented in Table 2 are greater than the shared variances of each construct in the conceptual framework. For instance, perceived enjoyment (0.850) significantly outperformed all its shared variations, and so did information quality (0.909) and service quality (0.850). (0.852). Therefore, to accurately determine discriminant validity, the Fornell–Larcker criteria were used in this study.

Table 2: Discriminant validity testing with Fornell Larcker

	ITU	InfoQ	PE	PEU	PU	SQ	SYSQ	UB
Intention to use	0.891							
Information quality	0.810	0.909						
Perceived enjoyment	0.845	0.823	0.850					
Perceived ease of use	0.828	0.828	0.796	0.857				
Perceived usefulness	0.826	0.833	0.824	0.803	0.846			
Service quality	0.839	0.803	0.842	0.804	0.828	0.852		
System quality	0.837	0.808	0.843	0.807	0.819	0.799	0.849	
Usage behavior	0.736	0.717	0.717	0.728	0.716	0.719	0.788	0.946

5.2. Structural model assessment

All the immediate influences or scientific theories are incorporated into the structural model. The new

path coefficient measurement was also used to properly evaluate the results, t-test statistics, and p-value. The results of the bootstrapping quantum computation for all influencing factors are shown in

Table 3 and Fig. 5. Furthermore, Table 3 summarizes the research outcome, considering all the key factors. The experimental research hypothesis stated is proven correct for the correlation between SYSQ and ITU (H1) (=0.129; t=2.046, p=0.041). The hypothesis was proven correct for the correlation between InfoQ->ITU to Use (H2) (=0.182; t=2.023, p=0.044). H3 and H4 were indeed proven to have a greater influence and control on SQ->ITU (=0.169; t=2.262;

p=0.024) and PU->ITU (=0.162; t=2.822; p=0.005). As a direct consequence, the hypotheses were accepted. Despite this, the PE->ITU (=0.250; t=5.490; p=0.000) and PEU->ITU (=0.109; t=3.953; p=0.000) hypotheses appear to be directly influenced. Hence, this clearly indicates that the hypotheses are accepted. Subsequently, ITU is an important indicator of usage behavior; H7 (=0.754; t=28.303; p=0.000) validates the research hypotheses.

Table 3: Hypotheses testing

| Path of hypotheses		Path (β)	t- value	p values	Results
Hypothesis 1 (H1)	System quality -> Intention to use	0.129	2.046	0.041	Supported
Hypothesis 2 (H2)	Information quality -> Intention to use	0.182	2.023	0.044	Supported
Hypothesis 3 (H3)	Service quality -> Intention to use	0.169	2.262	0.024	Supported
Hypothesis 4 (H4)	Perceived usefulness -> Intention to use	0.162	2.822	0.005	Supported
Hypothesis 5 (H5)	Perceived enjoyment -> Intention to use	0.250	5.490	0.000	Supported
Hypothesis 6 (H6)	Perceived ease of use -> Intention to use	0.109	3.953	0.000	Supported
Hypothesis 7 (H7)	Intention to use -> Usage behavior	0.754	28.303	0.000	Supported
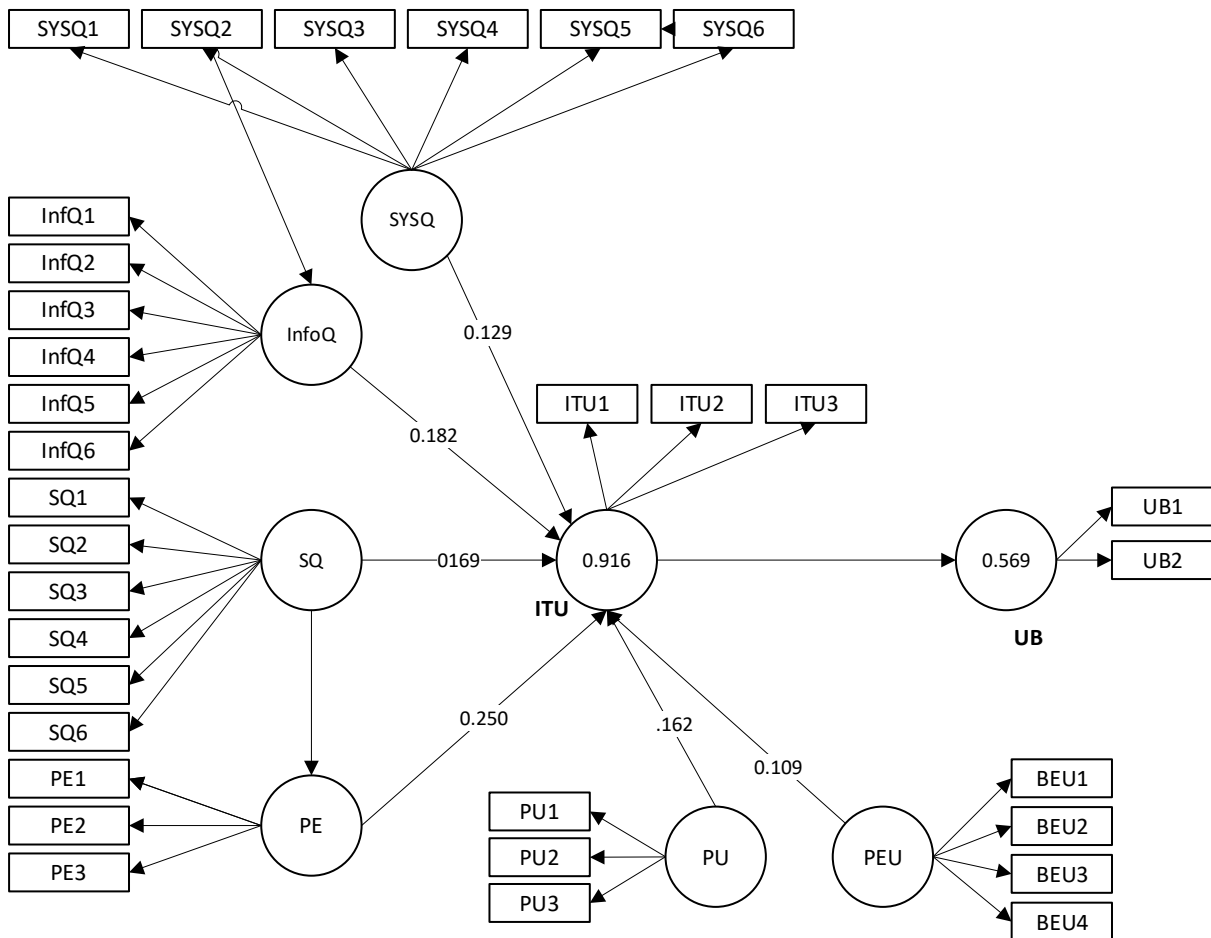
Fig. 5: Path coefficient findings

6. Discussion

The main objective of the research is to find out the new variables that might affect university students' intentions to use an LMS at Hai'l University in Saudi Arabia. The outcomes of the study and the structural model examination have all been substantial and have an influence on all of the variables under deep consideration. The findings show that SYSQ does indeed have a substantial influence on the college students' intent to use (ITU). The outcomes of the study are compatible with those of Al-Busaidi and Al-Shihi (2012), Chaw and Tang

(2018), and Jafari et al. (2015). This stresses the importance of performance issues such as social interaction, and the new layout in achieving college students' personal desire to use the completely new digital system.

Additionally, the InfoQ research results show that the ITU is greatly influenced. Almost all these results corroborate earlier studies by Zwain (2019), Alruwaie et al. (2020), and Jafari et al. (2015). This result appears perfectly reasonable, given that each LMS's ultimate focus should be to focus on providing college students mostly with necessary, highly accurate, relevant, and important data about their

own educational materials. College students are extra motivated to use the system if the LMS meets their needs and makes information available when needed.

This result, however, contradicts the findings of Chaw and Tang (2018), who discovered that the majority of the survey participants really do not yet believe that positive information quality is critical for advanced technology usage. This major consideration was also important in the context of SQ. These results are found to be concordant with immediately preceding research, which discovered that service quality was possibly the most essential defining factor of college students' intent to utilize a learning management system (Chaw and Tang, 2018; Liaw, 2008; Xu et al., 2014). These outcomes are most probably connected to the quality of service provided. College students will be more enthusiastic about using the digital system platform if the agency in charge of information and technology demonstrates a strong interest in finding solutions and responding in a timely manner.

The findings of this study demonstrated that even PU and PEOU have a massive effect on college students' intent to use certain learning management systems. This could be because understudies are eager to use blended learning as a learning management system while emphasizing its own economic advantages. These results are in agreement with those obtained by Juhary (2014), Claar et al. (2014), Joo et al. (2016), Saroia and Gao (2019), and Eraslan Yalcin and Kutlu (2019), who realized that PU greatly impacts the intention to use LMS enthusiastically. The structural model additionally expressed that perceived enjoyment does indeed have a substantial impact on correlation with the main intention of high school students to use LMS.

Those same findings of the study demonstrated the evidence from previous research by Khalid (2014), Findik-Coşkunçay et al. (2018), and Cavus et al. (2021), who found that perceived enjoyment was by far the highest influential variable that influenced students' performance and behavioral intent to use LMS. It appears that all these outcomes are indeed the direct consequence of the usually related fun or personal satisfaction commonly faced while using advanced technologies. This research project also appears to agree with some other research findings in indicating that a primary intent to use LMS is a key predictive factor of acceptance and usage (Joo et al., 2016; Saroia and Gao, 2019; Eraslan Yalcin and Kutlu, 2019).

7. Implications

7.1. Theoretical implications

The significant proportion of previous data analysis on student teachers' intentions concerning LMS use intent, specifically in relation to Saudi Arabia, has decided to focus on the TAM, DeLone, and McLean, with something like a few other studies studying the extra dimensions of emotional intelligence models. However, the present investigation aimed to combine the measurements of the TAM and motivational models (PU, PEOU, perceived enjoyment, intention to use, and usage behavior) with those of the extra dimensions of the DeLone and McLean Information Systems (IS) Success Model (information quality, service quality, and system quality).

This entire study empirically offers a unique, complete, and accurate overview of the different well-known modeling techniques (motivational model, DeLone and McLean model, and TAM), conceptual frameworks, and how individuals continue to influence college students' knowledge of their own specific intent to use LMS. Given that there is already a very small amount of research in relation to Saudi Arabia, this work, in the first place, may function as a starting point for potential future researchers in the research area. Because no previous published investigations in Saudi Arabia had already properly evaluated an extended conceptual model of the motivational model, Delone and Mclean model, and TAM, the outcome of this research adds significantly to the existing evidence-based research in this research area.

This research work's key findings demonstrate that the measurements of the motivational model, the TAM Model, and the Delone and Mclean Model all appear to be playing a distinct role in shaping the behavioral intention of college students to use LMS. The preliminary findings of this research paper generally supported the proposed expansion of the theoretical foundation.

In conclusion, the prevailing research is important because it manages to combine the motivational model, TAM, with the Delone and Mclean model. The new proposed conceptual model would therefore serve as a framework for possible prospective future study in light of the foregoing in the Arab Gulf countries, particularly Saudi Arabia.

7.2. Practical implications

The important role in the implementation of this research has always been to investigate the statistical validity of motivational models, TAM, and Delone and Mclean models in the Saudi Arabian-specific situation. This is accomplished using a student sample from the University of Hail. All of the study's hypotheses have been supported by relevant results, which support the implementation of the suggested model. This research study clearly shows that both male and female college students have the zeal and determination to use LMS. LMS are important tools that should be promoted to college students in an obvious attempt to expand their willingness to participate and their active involvement in advanced technology.

The LMS maintains the interaction channel accessible so that students may ask questions, issue reminders, and discuss topics relating to the course. This also enables interaction among other students.

The LMS helps in tracking college students' current performance throughout the entire semester. It has a feature for tracking the movement of their records, academic achievement, filings, and willingness to participate. It also gathers vital information and documents that student teachers swap over the cloud infrastructure. These, in turn, will be used to track their progress throughout the course.

In terms of practical implications, the outcomes of the research work are extremely valuable for academic institutions to figure out whether the identified variables really influence college students' behavioral intentions when using learning management systems in the context of Saudi Arabia.

In conclusion, the findings of the study may have an important implication for various stakeholders and college administrators in Saudi Arabia. Furthermore, this systematic conceptual model could be used as an instrument for strategy implementation and prioritization in an attempt to ascertain which variables affect college students' behavioral intention to employ LMS in the specific context of Saudi Arabia. As a result, top management staff would have a deeper understanding of the effects influencing LMS and would be assisted in continuing to increase student teachers' behavioral intention for using learning management systems.

Therefore, understanding the determinant variables influencing student teachers' intentions to use LMS could very well help to advance the domain of LMS utilization within and among Saudi Arabic students across the country. Furthermore, we concluded that these findings would result in interesting new knowledge and understanding of LMS usage patterns among high school students.

8. Conclusion

The present study aims to examine the key factors that influence college students' intentions to utilize LMS within the broader context of the teaching and learning process in Saudi Arabia. A conceptual framework is developed based on the Motivational Model, the TAM, the DeLone and McLean Success Models, and the McLean Information Systems (IS) Success Model. Seven hypothesized relationships are proposed and both theoretically and empirically evaluated using a sample of 224 college students in Saudi Arabia. The results of the study demonstrate significant correlations among all the hypothesized relationships. In addition to the immediate impact of Perceived Usefulness (PU) and Perceived Ease of Use (PEOU) on specific intentions to use LMS, the research conceptual model suggests that system quality, information quality, and service quality also have a direct influence on students' future behavioral intentions.

This exploratory study contributes to the existing body of research by developing a conceptual framework for understanding college students' behavioral intentions toward the future use of LMS within the broader teaching and learning context.

The Motivational Model, TAM, and DeLone and McLean Information Systems (IS) Success Model hold great promise as predictive frameworks for investigating students' specific intentions to use LMS. This is of significant importance for universities and government agencies seeking a better understanding of students' intentions to engage with LMS and enhance student-teacher involvement in LMS utilization. The updated integrated model has been tested using SmartPLS operating systems, and the results indicate that all dimensions of the model significantly predict student-teacher willingness to utilize LMS. This comprehensive framework can be employed to identify the factors that influence the attitudes and behavioral intentions of Saudi Arabian college students toward LMS usage.

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References

Abubakar AA, Jazim F, Al-Mamary YH, Abdulrab M, Abdalraheem SG, Siddiqui MA, and Alquhaif A (2023). Factors influencing students' intention to use learning management system at Saudi Universities: A structural equation modeling approach. Human Systems Management. https://doi.org/10.3233/HSM-220181

Al-Adwan A, Al-Adwan A, and Smedley J (2013). Exploring students acceptance of e-learning using technology acceptance model in Jordanian universities. International Journal of Education and Development Using Information and Communication Technology, 9(2): 4-18.

Alakrash HM and Razak NA (2019). Motivation towards the application of ICT in English language learning among Arab EFL students. Journal of Advanced Research in Dynamical and Control Systems, 11(10-Special Issue): 1197-1203. https://doi.org/10.5373/JARDCS/V11SP10/20192963 **PMid:32693719**

Al-Busaidi KA and Al-Shihi H (2010). Instructors' acceptance of learning management systems: A theoretical framework. Communications of the IBIMA, 2010: 862128. https://doi.org/10.5171/2010.862128

Al-Busaidi KA and Al-Shihi H (2012). Key factors to instructors' satisfaction of learning management systems in blended learning. Journal of Computing in Higher Education, 24: 18-39. https://doi.org/10.1007/s12528-011-9051-x

Alfraih MM and Alanezi FS (2016). Accounting students' perceptions of effective faculty attributes. Journal of International Education in Business, 9(2): 123-142. https://doi.org/10.1108/JIEB-04-2016-0004

Al-Gahtani SS (2016). Empirical investigation of e-learning acceptance and assimilation: A structural equation model. Applied Computing and Informatics, 12(1): 27-50. https://doi.org/10.1016/j.aci.2014.09.001

Al-Ghurbani AM, Jazim F, Abdulrab M, Al-Mamary YHS, and Khan I (2022). The impact of internal factors on the use of technology in higher education in Saudi Arabia during the COVID-19 pandemic. Human Systems Management, 41(2): 283-302. https://doi.org/10.3233/HSM-211219

Alharbi S and Drew S (2014). Using the technology acceptance model in understanding academics' behavioural intention to use learning management systems. International Journal of

Advanced Computer Science and Applications, 5(1): 143-155. https://doi.org/10.14569/IJACSA.2014.050120

Alkhwaldi A, Kamala M, and Qahwaji R (2017). From e-govemment to cloud-government: Challenges of Jordanian citizens' acceptance for public services. In the 12th International Conference for Internet Technology and Secured Transactions, IEEE, Cambridge, UK: 298-304. https://doi.org/10.23919/ICITST.2017.8356405

Al-Mamary YH and Alshallaqi M (2022). Impact of autonomy, innovativeness, risk-taking, proactiveness, and competitive aggressiveness on students' intention to start a new venture. Journal of Innovation and Knowledge, 7(4): 100239. https://doi.org/10.1016/j.jik.2022.100239

Al-Mamary YHS (2022a). Examining the factors affecting the use of ICT in teaching in Yemeni schools. Journal of Public Affairs, 22(1): e2330.

Al-Mamary YHS (2022b). Why do students adopt and use learning management systems? Insights from Saudi Arabia. International Journal of Information Management Data Insights, 2(2): 100088. https://doi.org/10.1016/j.jjimei.2022.100088

Al-Mamary YHS (2022c). Understanding the use of learning management systems by undergraduate university students using the UTAUT model: Credible evidence from Saudi Arabia. International Journal of Information Management Data Insights, 2(2): 100092. https://doi.org/10.1016/j.jjimei.2022.100092

Al-Mamary YHS and Alraja MM (2022). Understanding entrepreneurship intention and behavior in the light of TPB model from the digital entrepreneurship perspective. International Journal of Information Management Data Insights, 2(2): 100106. https://doi.org/10.1016/j.jjimei.2022.100106

Al-Mamary YHS, Abdulrab M, Alwaheeb MA, and Alshammari NGM (2020). Factors impacting entrepreneurial intentions among university students in Saudi Arabia: Testing an integrated model of TPB and EO. Education+Training, 62(7/8): 779-803. https://doi.org/10.1108/ET-04-2020-0096

Alomary A and Woollard J (2015). How is technology accepted by users? A review of technology acceptance models and theories. In the IRES 17th International Conference, London, UK: 1-4.

Alqahtani AY and Rajkhan AA (2020). E-learning critical success factors during the COVID-19 pandemic: A comprehensive analysis of e-learning managerial perspectives. Education Sciences, 10(9): 216. https://doi.org/10.3390/educsci10090216

Alruwaie M, El-Haddadeh R, and Weerakkody V (2020). Citizens' continuous use of eGovernment services: The role of self-efficacy, outcome expectations and satisfaction. Government Information Quarterly, 37(3): 101485. https://doi.org/10.1016/j.giq.2020.101485

Alshammari SH (2020). The influence of technical support, perceived self-efficacy, and instructional design on students' use of learning management systems. Turkish Online Journal of Distance Education, 21(3): 112-141. https://doi.org/10.17718/tojde.762034

Alshebami AS (2022). Psychological features and entrepreneurial intention among Saudi small entrepreneurs during adverse times. Sustainability, 14(13): 7604. https://doi.org/10.3390/su14137604

Alshebami AS and Al Marri SH (2022). The impact of financial literacy on entrepreneurial intention: The mediating role of saving behavior. Frontiers in Psychology, 13: 911605. https://doi.org/10.3389/fpsyg.2022.911605
PMid:35756317 PMCid:PMC9226410

Anderson RM, Heesterbeek H, Klinkenberg D, and Hollingsworth TD (2020). How will country-based mitigation measures influence the course of the COVID-19 epidemic? The Lancet, 395(10228): 931-934. https://doi.org/10.1016/S0140-6736(20)30567-5
PMid:32164834

Bagozzi RP (2007). The legacy of the technology acceptance model and a proposal for a paradigm shift. Journal of the Association for Information Systems, 8(4): 244-254. https://doi.org/10.17705/1jais.00122

Bagozzi RP, Davis FD, and Warshaw PR (1992). Development and test of a theory of technological learning and usage. Human Relations, 45(7): 659-686. https://doi.org/10.1177/001872679204500702

Bhattacherjee A (2001). Understanding information systems continuance: An expectation-confirmation model. MIS Quarterly, 25(3): 351-370. https://doi.org/10.2307/3250921

Bhuasiri W, Xaymoungkhoun O, Zo H, Rho JJ, and Ciganek AP (2012). Critical success factors for e-learning in developing countries: A comparative analysis between ICT experts and faculty. Computers and Education, 58(2): 843-855. https://doi.org/10.1016/j.compedu.2011.10.010

Binyamin S, Rutter M, and Smith S (2017). Factors influencing the students' use of learning management systems: A case study of King Abdulaziz University. In Proceedings of the 12th International Conference on E-learning, Academic Conferences and Publishing Limited, Orlando, USA: 289-297. https://doi.org/10.21125/inted.2017.2205

Cavus N, Mohammed YB, and Yakubu MN (2021). Determinants of learning management systems during COVID-19 pandemic for sustainable education. Sustainability, 13(9): 5189. https://doi.org/10.3390/su13095189

Chang JCJ and King WR (2005). Measuring the performance of information systems: A functional scorecard. Journal of Management Information Systems, 22(1): 85-115. https://doi.org/10.1080/07421222.2003.11045833

Chaw LY and Tang CM (2018). What makes learning management systems effective for learning? Journal of Educational Technology Systems, 47(2): 152-169. https://doi.org/10.1177/0047239518795828

Cheng YM (2012). The effects of information systems quality on nurses' acceptance of the electronic learning system. Journal of Nursing Research, 20(1): 19-31. https://doi.org/10.1097/JNR.0b013e31824777aa
PMid:22333963

Claar C, Portolese Dias L, and Shields R (2014). Student acceptence of learning management systems: A study on demographics. Issues in Information Systems, 15(1): 409-417.

Davis FD (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. MIS Quarterly, 13(3): 319-340. https://doi.org/10.2307/249008

Davis FD, Bagozzi RP, and Warshaw PR (1989). User acceptance of computer technology: A comparison of two theoretical models. Management Science, 35(8): 982-1003. https://doi.org/10.1287/mnsc.35.8.982

Davis FD, Bagozzi RP, and Warshaw PR (1992). Extrinsic and intrinsic motivation to use computers in the workplace. Journal of Applied Social Psychology, 22(14): 1111-1132. https://doi.org/10.1111/j.1559-1816.1992.tb00945.x

DeLone WH and McLean ER (2003). The DeLone and McLean model of information systems success: A ten-year update. Journal of Management Information Systems, 19(4): 9-30. https://doi.org/10.1080/07421222.2003.11045748

Dulloo R, Mokashi J, and Puri MM (2014). Exploring technology acceptance theories and models-A comparative analysis. In the MIT-SOM PGRC KJIMRP 1st International Conference, Pune, India: 308–317.

Eraslan Yalcin M and Kutlu B (2019). Examination of students' acceptance of and intention to use learning management systems using extended TAM. British Journal of Educational

Technology, 50(5): 2414-2432. https://doi.org/10.1111/bjet.12798

Etezadi-Amoli J and Farhoomand AF (1996). A structural model of end user computing satisfaction and user performance. Information and Management, 30(2): 65-73. https://doi.org/10.1016/0378-7206(95)00052-6

Findik-Coşkunçay D, Alkiş N, and Özkan-Yildirim S (2018). A structural model for students' adoption of learning management systems: An empirical investigation in the higher education context. Journal of Educational Technology and Society, 21(2): 13-27. https://doi.org/10.1037/t70573-000

Fornell C and Larcker DF (1981). Structural equation models with unobservable variables and measurement error: Algebra and statistics. Journal of Marketing Research, 18(3): 382–388. https://doi.org/10.1177/002224378101800313

Garrison DR (2011). E-learning in the 21st century: A framework for research and practice. 2nd Edition, Routledge/Taylor and Francis, London, UK.

Ghazal S, Aldowah H, Umar I, and Bervell B (2018). Acceptance and satisfaction of learning management system enabled blended learning based on a modified DeLone-McLean information system success model. International Journal of Information Technology Project Management, 9(3): 52-71. https://doi.org/10.4018/IJITPM.2018070104

Goodhue DL and Thompson RL (1995). Task-technology fit and individual performance. MIS Quarterly, 19(2): 213-236. https://doi.org/10.2307/249689

Guimaraes T and Igbaria M (1997). Client/server system success: Exploring the human side. Decision Sciences, 28(4): 851-876. https://doi.org/10.1111/j.1540-5915.1997.tb01334.x

Habibi-Yangjeh A, Asadzadeh-Khaneghah S, Feizpoor S, and Rouhi A (2020). Review on heterogeneous photocatalytic disinfection of waterborne, airborne, and foodborne viruses: Can we win against pathogenic viruses? Journal of Colloid and Interface Science, 580: 503-514. https://doi.org/10.1016/j.jcis.2020.07.047 **PMid:32711201 PMCid:PMC7361121**

Hair JF, Risher JJ, Sarstedt M, and Ringle CM (2019). When to use and how to report the results of PLS-SEM. European Business Review, 31(1): 2-24. https://doi.org/10.1108/EBR-11-2018-0203

Jafari SM, Salem SF, Moaddab MS, and Salem SO (2015). Learning management system (LMS) success: An investigation among the university students. In the IEEE Conference on e-Learning, e-Management and e-Services (IC3e), IEEE, Melaka, Malaysia: 64-69. https://doi.org/10.1109/IC3e.2015.7403488

Joo YJ, Kim N, and Kim NH (2016). Factors predicting online university students' use of a mobile learning management system (m-LMS). Educational Technology Research and Development, 64: 611-630. https://doi.org/10.1007/s11423-016-9436-7

Juhary J (2014). Perceived usefulness and ease of use of the learning management system as a learning tool. International Education Studies, 7(8): 23-34. https://doi.org/10.5539/ies.v7n8p23

Khalid N (2014). The role of perceived usefulness and perceived enjoyment in assessing students' intention to use LMS using 3-TUM. In the Conference of Global Summit on Education GSE, Kuala Lumpur, Malaysia.

Lai C, Wang Q, and Lei J (2012). What factors predict undergraduate students' use of technology for learning? A case from Hong Kong. Computers and Education, 59(2): 569-579. https://doi.org/10.1016/j.compedu.2012.03.006

Lee SM and Chen L (2010). The impact of flow on online consumer behavior. Journal of Computer Information Systems, 50(4): 1-10.

Liaw SS (2008). Investigating students' perceived satisfaction, behavioral intention, and effectiveness of e-learning: A case study of the Blackboard system. Computers and Education, 51(2): 864-873. https://doi.org/10.1016/j.compedu.2007.09.005

Lin KM (2011). E-learning continuance intention: Moderating effects of user e-learning experience. Computers and Education, 56(2): 515-526. https://doi.org/10.1016/j.compedu.2010.09.017

Lui RW, Lo KK, and Yiu SM (2013). Evaluating and adopting e-learning platforms. International Journal of e-Education, e-Business, e-Management and e-Learning, 3(3): 229-233.

McKinney ML (2002). Urbanization, biodiversity, and conservation the impacts of urbanization on native species are poorly studied, but educating a highly urbanized human population about these impacts can greatly improve species conservation in all ecosystems. Bioscience, 52(10): 883-890. https://doi.org/10.1641/0006-3568(2002)052[0883:UBAC]2.0.CO;2

Mohammadi H (2015). Investigating users' perspectives on e-learning: An integration of TAM and IS success model. Computers in Human Behavior, 45: 359-374. https://doi.org/10.1016/j.chb.2014.07.044

Ozkan S and Koseler R (2009). Multi-dimensional students' evaluation of e-learning systems in the higher education context: An empirical investigation. Computers and Education, 53(4): 1285-1296. https://doi.org/10.1016/j.compedu.2009.06.011

Panagopoulos C (2010). Affect, social pressure and prosocial motivation: Field experimental evidence of the mobilizing effects of pride, shame and publicizing voting behavior. Political Behavior, 32: 369-386. https://doi.org/10.1007/s11109-010-9114-0

Park SY (2009). An analysis of the technology acceptance model in understanding university students' behavioral intention to use e-learning. Journal of Educational Technology and Society, 12(3): 150-162.

Pitt LF, Watson RT, and Kavan CB (1995). Service quality: A measure of information systems effectiveness. MIS Quarterly, 19(2): 173-187. https://doi.org/10.2307/249687

Ragu-Nathan TS, Tarafdar M, Ragu-Nathan BS, and Tu Q (2008). The consequences of technostress for end users in organizations: Conceptual development and empirical validation. Information Systems Research, 19(4): 417-433. https://doi.org/10.1287/isre.1070.0165

Rai A, Lang SS, and Welker RB (2002). Assessing the validity of IS success models: An empirical test and theoretical analysis. Information Systems Research, 13(1): 50-69. https://doi.org/10.1287/isre.13.1.50.96

Raza SA, Qazi W, Khan KA, and Salam J (2021). Social isolation and acceptance of the learning management system (LMS) in the time of COVID-19 pandemic: An expansion of the UTAUT model. Journal of Educational Computing Research, 59(2): 183-208. https://doi.org/10.1177/0735633120960421 **PMCid:PMC7509242**

Rehman AU, Al Shammari S, and Al-Mamary YH (2022). Role of religiosity and the mediating effect of luxury value perception in luxury purchase intention: A cross-cultural examination. Journal of Islamic Marketing, 13(4): 975-995. https://doi.org/10.1108/JIMA-03-2021-0091

Samaradiwakara GDMN and Gunawardena CG (2014). Comparison of existing technology acceptance theories and models to suggest a well improved theory/model. International Technical Sciences Journal, 1(1): 21-36.

Saroia AI and Gao S (2019). Investigating university students' intention to use mobile learning management systems in Sweden. Innovations in Education and Teaching International, 56(5): 569-580. https://doi.org/10.1080/14703297.2018.1557068

Sedera D, Gable G, and Chan T (2004). A factor and structural equation analysis of the enterprise systems success measurement model. In: Stohr E and Bullen C (Eds.), Proceedings of the 10th Americas conference on information systems: 676-682. Association for Information Systems, Atlanta, USA.

Shroff RH, Deneen CC, and Ng EM (2011). Analysis of the technology acceptance model in examining students' behavioural intention to use an e-portfolio system. Australasian Journal of Educational Technology, 27(4): 600-618. https://doi.org/10.14742/ajet.940

Teo T (2016). Modelling Facebook usage among university students in Thailand: The role of emotional attachment in an extended technology acceptance model. Interactive Learning Environments, 24(4): 745-757. https://doi.org/10.1080/10494820.2014.917110

Thong JY, Hong SJ, and Tam KY (2006). The effects of post-adoption beliefs on the expectation-confirmation model for information technology continuance. International Journal of Human-Computer Studies, 64(9): 799-810. https://doi.org/10.1016/j.ijhcs.2006.05.001

Turban E, King D, Lee JK, Liang TP, and Turban DC (2015). Electronic commerce: A managerial and social networks perspective. Springer, Cham, Switzerland. https://doi.org/10.1007/978-3-319-10091-3

Venkatesh V and Speier C (1999). Computer technology training in the workplace: A longitudinal investigation of the effect of mood. Organizational Behavior and Human Decision Processes, 79(1): 1-28. https://doi.org/10.1006/obhd.1999.2837 **PMid:10388607**

Venkatesh V, Morris MG, Davis GB, and Davis FD (2003). User acceptance of information technology: Toward a unified view. MIS Quarterly, 27(3): 425-478. https://doi.org/10.2307/30036540

Wang YS, Wang HY, and Shee DY (2007). Measuring e-learning systems success in an organizational context: Scale development and validation. Computers in Human Behavior, 23(4): 1792-1808. https://doi.org/10.1016/j.chb.2005.10.006

Wixom BH and Todd PA (2005). A theoretical integration of user satisfaction and technology acceptance. Information Systems Research, 16(1): 85-102. https://doi.org/10.1287/isre.1050.0042

Xu D, Huang WW, Wang H, and Heales J (2014). Enhancing e-learning effectiveness using an intelligent agent-supported personalized virtual learning environment: An empirical investigation. Information and Management, 51(4): 430-440. https://doi.org/10.1016/j.im.2014.02.009

Zwain AAA (2019). Technological innovativeness and information quality as neoteric predictors of users' acceptance of learning management system: An expansion of UTAUT2. Interactive Technology and Smart Education, 16(3): 239-254. https://doi.org/10.1108/ITSE-09-2018-0065